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Review of the *Epeolus cruciger* species group (Hymenoptera, Apidae, *Epeolus* Latreille, 1802) of Asia, with the description of two new species

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Abstract

The six species of the *Epeolus cruciger* species group from Asia are reviewed. Two new species, *Epeolus asiaticus* Astafurova & Proshchalykin, **sp. nov.** (Mongolia, Russia) and *E. gorodkovi* Astafurova, **sp. nov.** (Tajikistan, Afghanistan) are described and illustrated. *Epeolus alpinus* Friese, 1893 is newly recorded from Kazakhstan; *E. cruciger* (Panzer, 1799) is newly recorded from Turkmenistan, Uzbekistan, and Kyrgyzstan; and *E. mongolicus* Astafurova & Proshchalykin, 2021 is newly recorded from Kyrgyzstan and Russia. An identification key for both sexes of all Asian members of this species group is presented.

Keywords

Anthophila, Apiformes, cleptoparasites, Palaearctic region, taxonomy

Introduction

The present paper is part of a series of works dealing with the bees of the genus *Epeolus* Latreille, 1802 of the Asian Palaearctic (Astafurova and Proshchalykin 2021a, b, c). The genus *Epeolus* includes more 118 species spread across much of the globe; they occur throughout the Holarctic zone, from the west coast of the United States and eastwards to Europe and as far as Japan (Michener 2007). About 40 species are known

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from the Palaearctic region, of which 25 species are found within Asia (Astafurova and Proshchalykin 2021a, b, c; Bogusch 2021; Ascher and Pickering 2022; current data).

There, the *cruciger* species group includes *Epeolus alpinus* Friese, 1893, *E. cruciger* (Panzer, 1799), *E. laevifrons* Bischoff, 1930, *E. schummeli* Schilling, 1849, *E. sigillatus* Alfken, 1930, and *E. mongolicus* Astafurova & Proshchalykin, 2021 (Bogusch and Hadrava 2018; Astafurova and Proshchalykin 2021b; Le Divelec 2021). Species of the *E. cruciger* group show considerable intraspecific variation, making it difficult to discern their identities and the status of the species. For these reasons, we paid special attention to their considerable variability.

Here, we add two new species to this group: *E. asiaticus* Astafurova & Proshchalykin, sp. nov. and *E. gorodkovi* Astafurova, sp. nov. from various territories of Central Asia.

Materials and methods

The results presented in this paper are based on 640 *Epeolus cruciger* species group specimens currently housed in the Zoological Institute, Russian Academy of Sciences (St. Petersburg, Russia, **ZISP**); Zoological Museum of the Moscow State University (Moscow, Russia, **ZMMU**); Federal Scientific Center of the East Asia Terrestrial Biodiversity, Far Eastern Branch of Russian Academy of Sciences (Vladivostok, Russia, **FSCV**); and Oberösterreichisches Landesmuseum, Biologiezentrum (Linz, Austria, **OLBL**).

The taxonomy and synonymy of species follow those of Bogusch and Hadrava (2018). Morphological terminology follows that of Engel (2001) and Michener (2007). The density of integumental punctures is described using the following formula: puncture diameter (in μm) / ratio of distance between punctures to average puncture diameter, e.g., 15–20 μm / 0.5–1.5.

Abbreviations T and S are used for metasomal tergum and metasomal sternum, respectively.

The species are listed alphabetically. We have used the following abbreviations for collectors: **AL** – A. Lelej; **DS** – D. Sidorov, **JH** – J. Halada, **MK** – M. Kozlov, **MP** – M. Proshchalykin; **PK** – P. Kozlov, **SB** – S. Belokobylskij; **SL** – S. Luzyanin; **VL** – V. Loktionov.

Specimens were studied with an Olympus SZ51 stereomicroscope and photographs were taken with a combination of stereomicroscope (Olympus SZX10) and digital camera (Olympus OM-D). Final images are stacked composites generated using Helicon Focus 7.7.4 Pro. All images were post-processed for contrast and brightness using Adobe Photoshop. New distributional records are noted with an asterisk (*).

Taxonomy

Genus *Epeolus* Latreille, 1802

Epeolus Latreille, 1802: 427. Type species: *Apis variegata* Linnaeus, 1758, monobasic.

Epeolus cruciger species group

Diagnosis. Labrum with apical margin straight or medially slightly curved, with small distinct medial tooth; sub-apically (as opposed to medially, as in species in the *Epeolus variegatus* species group, or apically, as in species in the *E. julliani* species group) with two obvious teeth (tubercles). Axilla flat, with small apical tooth or without distinct tooth. Species of the group are quite variable in the body size, coloration and pubescence.

Species included. *Epeolus alpinus* Friese, 1893, *E. asiaticus* Astafurova & Proshchalykin, sp. nov., *E. cruciger* (Panzer, 1799), *E. gorodkovi* Astafurova sp. nov., *E. laevifrons* Bischoff, 1930, *E. mongolicus* Astafurova & Proshchalykin, 2021, *E. schummeli* Schilling, 1849, *E. sigillatus* Alfken, 1930.

Key to Asian species (not including Crete-endemic *E. sigillatus*)

1 Vertex not elevated, hardly visible as seen as frontal view **2**

– Vertex elevated, obvious, distance from top of head to upper margin of lateral ocellus about two lateral ocellar diameters as seen in frontal view..... ..... ***E. schummeli* Schilling**

2 Upper half of frons with short simple setae and confluent punctures. Terga with apical bands of tomentum interrupted. Male gonostylus mostly parallel-sided as seen in lateral view (Fig. 9H), with narrow apical area (membranous area with setae) as seen in ventral view (Fig. 9D)..... ***E. cruciger* (Panzer)**

– Upper half of frons with relatively long, erect simple setae (can be mixed with adpressed, plumose pubescence) and usually with polished interspaces between punctures (confluent punctures without distinct polished interspaces as in *E. gorodkovi* sp. nov.). Terga with apical bands of tomentum uninterrupted or interrupted. Male gonostylus apically distinctly curved and triangular as seen as lateral view (Fig. 9E–G); with apical area (membranous area with setae) wider as seen as ventral view (Fig. 9A–C) **3**

3 Pubescence coloration monochromatic (golden or copper); terga entirely covered with dense tomentum..... ..... ***E. mongolicus* Astafurova & Proshchalykin (male unknown)**

– Pubescence coloration mixed (whitish/yellowish and brownish) or yellowish monochromatic; tergal pubescence heterogeneous, dense tomentum foming light, well-visible spots or bands..... **4**

4 Tergal discs entirely black. Labrum, pronotal lobes, axillae and mesoscutellum black, reddish or amber **5**

– Tergal coloration variable, but yellow-reddish pattern usually well-developed or at least on posterior half of T5 (Fig. 7A–I). Labrum, pronotal lobes, axillae and mesoscutellum yellow-reddish (amber)..... ***E. asiaticus* sp. nov.**

5 Terga each with uninterrupted apical band of tomentum; marginal zones pale-yellow to golden ..... ***E. gorodkovi* sp. nov.**

– Terga each with interrupted apical band of tomentum; marginal zones black or brownish **6**

6 Mesoscutum and mesoscutellum sparsely punctate with punctures separated by more than one puncture diameter ..... ***E. laevifrons*** **Bischoff**

– Mesoscutum and mesoscutellum densely punctate with confluent punctures to separated by about one puncture diameter..... ***E. alpinus*** **Friese**

Epeolus alpinus Friese, 1893

Figs 5A, B, 9C, G

Epeolus alpinus Friese, 1893: 34, ♀, ♂ (type locality: Goeschenen, Switzerland), Natural History Museum, Berlin.

Epeolus variegatus Thomson, 1872 (nom. praeocc., nec Linnaeus, 1758): 212, ♀ (type locality: unknown), Zoological Museum, University of Lund, Sweden.

Epeolus glacialis Alfken, 1913: 36, nomen novum for *E. variegatus* Thomson, 1872.

Epeolus montanus Bischoff, 1930: 9, ♀, ♂ (type locality: Warnemünde, Germany), Natural History Museum, Berlin.

Epeolus pilosus Bischoff, 1930: 9–10, ♀, ♂ (type locality: Rositten [=Rybachij], Kaliningrad Prov., Russia), Natural History Museum, Berlin.

Epeolus alpinus Bischoff, 1930 (nom. praeocc., nec Friese, 1893): 9–10, ♀ (type locality: Saas, Switzerland), Natural History Museum, Berlin.

Material examined. Russia, *Sverdlovsk Prov.*, Sysertskiy distr., Dvurechensk, 18.VII.2009, (1 ♀), K. Fadeev [ZISP]; *Kemerovo Prov.*, Belkovo, 9.VII.2003, (1 ♀), DS [ZISP]; Tashtagol distr., Podkatun' rocks, 7.VII.2005, (1 ♂), A. Korneeva [ZISP]; *Altai Rep.*, Onguday, 16.VI.1909, (1 ♂), W. Steinfeld [ZISP]; *Tuva Rep.*, Nikolskoye [Bay-Khaak], 18–30.VI.1916, (1 ♂), Miklashevskaya [ZISP]; 15 km W Turan, 2.VIII.2009, (2 ♀), SB [ZISP]; 90 km S Kyzyl, Chagytay Lake, 21.VII.2010, (1 ♀), SB [ZISP]; Kara Sug Lake, 1254 m, 19.VII.2013, 1 ♀, M. Sherbakov [ZISP]; 12 km SW Samagaltay, Dyttyg-Khem River, 17.VII.2014, (1 ♀), AS, MP [FSCV]; 5 km E of Khandagayta, 29.VII.2018, (1 ♀, 1 ♂), SL, DS [ZISP]; 11 km SW of Teeli, 1.VIII.2018, (1 ♀), SL, DS [ZISP]; *Khakassia Rep.*, Bely Yar, Abakan River, 11–12.VII.2012, (1 ♀), MP, VL [FSCV]; 10 km E Shira, Itkul' Lake, 28–29.VII.2014, (1 ♂), AL, MP, VL [FSCV]; *Irkutsk Prov.*, Utulik, Baikal Lake, 12.VII.2019, (1 ♀), Yu. Astafurova [ZISP]; Angarsk, Ketoy River, 8.VIII.1994, (5 ♀), AL [FSCV/ZISP]; 15 km E Ust'-Ordynskiy, 31.VII–5.VIII.1994, (23 ♀, 2 ♂), AL [FSCV/ZISP]; Irkutsk, (8 ♀, 11 ♂), V. Yakovlev [ZISP]; Bratsk, Sosnovy Isl., 1.VIII.1996, (1 ♀, 2 ♂), P. Klimov [FSCV/ZISP]; *Buryatia Rep.*, Kurumkanskiy distr., Mayskiy, 23.VII.1995, (2 ♀), S. Rudykh [ZISP]; *Zabaikalskiy Terr.*, Khilo, 30.VII.1911, (1 ♀), D. Rudskaya [ZISP]; Uida, Nerechinsk, VI.1912, (1 ♂), Pisarvvskikh [ZISP]; Bolvzino, 14.VII.1925, (1 ♀), B. Vinogradov [ZISP]; Nizhniy Tsasuchey, 2.VII.1996, (1 ♀, 1 ♂), V. Dubatolov [ZISP]; *Yakutia*, Oy-Bes', 28.VI.1925, (3 ♂), L. Bianki [N. Davydova det. 2000 2 ♂ as *E. cruciger* and 1 ♂ as *E. variegatus*] [ZISP]; Yakutsk, 27.VI.1927, (3 ♂), Moskvin [N. Davydova det. 2000 2 ♂ as *E. cruciger* and 1 ♂ as *E. variegatus*] [ZISP]; Zhemkon-2, Lena River, 75 km N Yakutsk, (1 ♂), 11.VII. 1999, N. Davydova [N. Davydova det. 2000 as *E. cruciger*]

[ZISP]; *Khabarovsk Terr.*, Komsomolsk-on-Amur, 18.VII.2002, (1 ♀), Mutin [ZISP]; *Sakhalin*, Astokh Bay, E Piltun, 18.VII.2001, (1 ♀), AS [FSVC]; Sakhalin Bay, Lyugi, 12.VIII.2001, (4 ♀, 4 ♂), AL [FSVC/ZISP]; Moskalvo, 13.VIII.2001, (8 ♀, 12 ♂), AL [FSVC/ZISP]; Bolshoye Vavayskoye Lake, 18.VII.2002, (1 ♀, 1 ♂), AL [FSVC/ZISP]; Krasnogorsk, Aynskoye Lake, 20.VII.2003, (3 ♀, 1 ♂), AL [FSVC/ZISP]; 5 km N Tymovskiy, 31.VII.2003, (1 ♀), AL [FSVC]; KAZAKHSTAN, Kokchetav distr., Borovoye, 15–26.VII.1932, (2 ♀, 2 ♂), V. Popov [ZISP]; MONGOLIA, see Astafurova and Proshchalykin (2021b: 14).

Variability. Asian specimens examined are on average bigger than European ones (6.0–8.0 mm vs 5.0–6.0 mm). Female. Unlike *E. cruciger* and *E. asiaticus* sp. nov., this species does not have individuals with a red pattern on integunent of the metasomal terga. The pronotal lobe, mesoscutellum and axillae are red in most of studied Asian specimens; these structures are mostly black in specimens from the European range; only 6% of all examined females have a red labrum. Pubescence of the head and mesosoma, tergal bands or spots of tomentum are white or pale yellow. The mesoscutum is without tomentum in most specimens, rarely with weak tomentum anteriorly. Most examined specimens have widely interrupted apical bands of pale tomentum on T1 and T2 and two pairs of spots of pale tomentum on T3 and T4 (Fig. 5A), but sometimes the lateral spots on T3 and T4 are reduced and only a medial pair is present. Specimens examined from isolated populations of Sakhalin Isl. (Russia) differ from typical forms in having well-developed tomentum on the marginal zones of the terga, which are present as narrowly interrupted bands or even uninterrupted bands on T3 and T4 (Fig. 5B); the mesoscutum is denser punctate than in continental specimens. Male. The males do not show significant variability in coloration. Yellow-red coloration is absent, except on the mouth parts, legs (partly), tegulae and rarely the pygidial plate. Tergal bands of white tomentum are widely or narrow interrupted medially by regular brownish tomentum, sometimes reduced to two pairs of spots on T3 and T4; T1 apical bands can be rarely uninterrupted. Specimens from Sakhalin Isl. as well as females differ in having well-development apical bands of tomentum, which are present as uninterrupted bands on all terga or at least on T3 and T4. Further molecular studies might help to determine whether the forms from Sakhalin merit separate subspecies or species status.

Distribution. Europe, Turkey, Iran, Russia, *Kazakhstan (Kokchetau Province), Mongolia (Bogusch and Hadrava 2018; Astafurova and Proshchalykin 2021b). Bogusch (2018) mentioned records from North Africa.

Epeolus asiaticus **Astafurova & Proshchalykin, sp. nov.**
https://zoobank.org/AAF37DDD-7282-43B9-9F0C-70EC3E1E7C21
Figs 1, 2, 7, 8, 9B, F

Material examined. ***Holotype*****:** ♀, Mongolia, Terkhin-Gol, Chulut and Khoit Rivers, 30.VI.1975, E. Narchuk [ZISP]. ***Paratypes*****:** 1 ♀, 2 ♂, the same label as in the holotype [ZISP]; 1 ♀, Russia, Altay Republic, 8 km SW of Kurai, 11.VII.2007,

S. Belokobylskij [ZISP]; 2 ♂, 24 km NWW of Aktash, Chuya River, 30.VI.2016, M. Proshchalykin, V. Loktionov [FSCB/ZISP]; 1 ♀, 15 km SE of Kurai, Chuya River, 5–6.VII.2016, M. Proshchalykin, V. Loktionov [FSCB/ZISP].

Additional material. Russia, *Tuva Rep.*, 25 km SE Erzin, Tes-Khem River, 14–15.VII.2014, (1 ♀), AL, MP, VL [ZISP]; 5 km E Khandagayta, 30.VII.2018, (1 ♀), DS, SL [ZISP]; *Zabaikalskiy Terr.*, Nerchinsk env., (1 ♀), VII.1910, V. Podgorbinskiy [ZISP]; Sotkul, 17.VI.1925, (1 ♂), Vinogradov [ZISP]; Burun-Torey Lake, Ulza River, 29.VI.1925, (1 ♂), Vinogradov [ZISP]; Balyra, 23.VII.1975, (1 ♂), D. Kasparyan [ZISP]; Mongolia, *Arkhangai*, Sumiyn and Chultun Gol Rivers, 29.VI.1975, (2 ♀, 2 ♂), MK [ZISP]; 17 km SW Ulyasutai, Gantsyn-Daba Pass, 16.VII.1980, (1 ♂), MK [ZISP]; 15 km S Tosan-Tsengela, 18.VII.1980, (1 ♀), MK [ZISP]; Chuluut Gol River, 1940 m, 23.VII.2005, (1 ♀), JH [OLBL]; *Bayankhongor*, 56 km NW of Bayankhongor, 2200 m, 12.VII.2004, (1 ♀, 4 ♂), JH [OLBL]; *Bayan-Ölgii*, 15 km SW Delun, Dzhangyz-Agach-Gol River, 21.VII.1978, (1 ♀), MK [ZISP]; *Dornod*, Dorsargalant, Ider River, 20.VII.1975, (2 ♀), E. Narchuk, E. Sugonyaev [ZISP]; 17 km N Shine-Edera, 21.VII.1975, (1 ♀, 1 ♂), E. Sugonyaev [ZISP]; 25 km SSW Murene, 23.VII.1975, (2 ♀), MK [ZISP]; western part of Khukh-Nur Lake, 25–26.VI.1976, (1 ♂), MK [ZISP]; *Dornogovi*, Atayn Mts, Gichigniv Nuruu, 10 km SW Sain-Shand, 12.VII.2005, (1 ♀), JH [OLBL]; *Govi-Altai*, 35 km E Altai, 15.VI.1980, (1 ♀), MK [ZISP]; 70 km E of Altay Sity, Guulin, 14.VII.2005, (2 ♀), P. Tymer [OLBL]; *Khuvsgul*, Dzhargalant, Ider River, 19.VII.1975, (1 ♀), E. Sugonyaev [ZISP]; 17 km N of Shine-Eder, 21.VII.1975, (2 ♀), E. Sugonyaev [ZISP]; Terkhiyn-Tsaggan Lake, 2100 m, 22.VII.2005, (3 ♀), JH [OLBL]; *Omnogovi*, Khuchin, Khalka, 20.V.1909, (1 ♀), PK [ZISP]; Buchuk-Gol, Khalka, 25.VII.1909, (1 ♀), PK [ZISP]; *Selenge*, 90 km N of Ulaanbaatar, Segnez River, 1450 m, 6–8.VII.2003, (3 ♀, 1 ♂), JH [OLBL]; Atayn Mts., Gichigniy Nuruu, 10 km SW Talshand, 12.VII.2005, (51 ♀, 3 ♂), Kadlecova [FSCV]; *Sukhbaatar*, 100 km SSW of Baruun-Urt, 1100 m, 30.VII.2007, (1 ♀), M. Halada [OLBL]; *Tuv*, 100 km E of Ulaanbaatar, 20 km NE of Tereltz, Tuul River, 15–21.VII.2003, (1 ♀, 11 ♂), JH [OLBL]; Khangaun Mts, 5 km N of Khunt, 20.VII.2005, (4 ♀, 1 ♂), JH [OLBL]; *Ulaanbaatar*, Tola River, Urga [=Ulaanbaatar], 30.VI–8.VII.1905, (28 ♀, 2 ♂), PK [ZISP]; Urga env. [=Ulaanbaatar], 30.VI, (4 ♀, 1 ♂), PK [ZISP]; Sangin, Urga [=Ulaanbaatar], 25.VII.1905, (1 ♀), PK [ZISP]; "Tzorgol-Khayrkhan" [SW Ulaanbaatar], 23.VII.1909, (1 ♂), PK [ZISP]; Ulanbaatar, Tuul River valley, 12.VII.2003, (1 ♂), JH [ZISP]; *Uvs*, 20 km S Under-Khangai, Chigzhiin-Gol River, 2.VII.1978, (5 ♀, 1 ♂), MK [ZISP]; Ureg-Nur Lake, Kargy River, 6.VII.1978, (1 ♀), MK [ZISP]; *Uvurkhangai*, Soldzhin Col River, 29.VII.1899, (1 ♀), V. Soldatov [ZISP]; Kholt [375 km SW Ulaanbaatar], Northern Gobi, 15–19.VII.1926, (3 ♀, 4 ♂), PK [ZISP]; Lamyn-gegen, SE Khangai, 19.VII.1926, (8 ♀), Kirichenko [ZISP]; 20 km W Nariyn-Tel, 9.VII.1970, (1 ♂), MK [ZISP]; 90 km WWS Arbat-Khere, 22.VI.1985, (1 ♀), A. Gorokhov [ZISP]; 12 km E of Arvaykheer, 1770 m, 3.VII.2004, (3 ♀), JH [OLBL]; *Zavkhan*, Eastern part of Telmen Lake, 30.VI.1978, (1 ♂), MK [ZISP]; 40 km SW of Uliastay, dunes, 18.VII.2005, (9 ♀, 2 ♂), JH [OLBL].

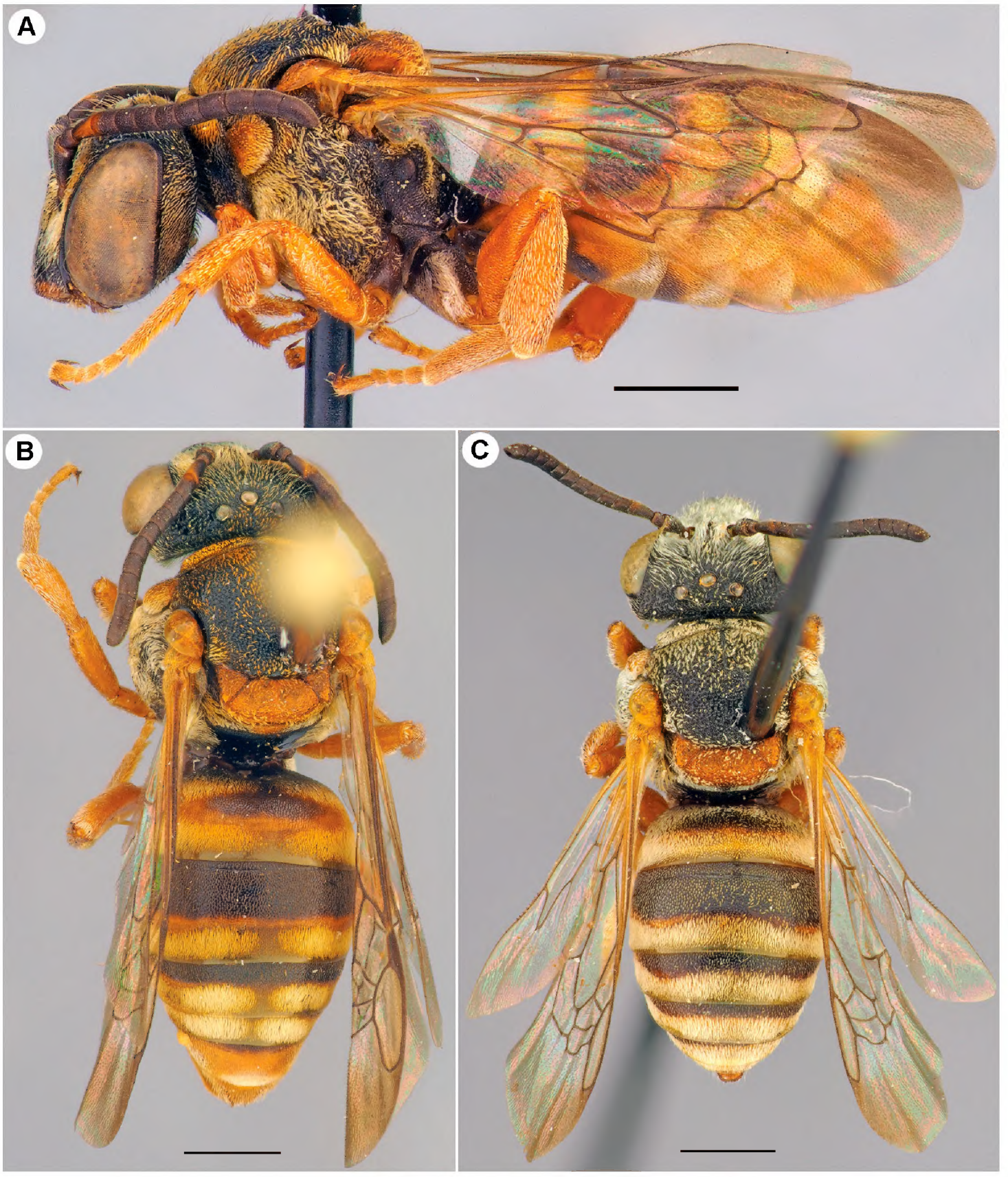

Figure 1. *Epeolus asiaticus* Astafurova & Proshchalykin, sp. nov., holotype, female (**A, B**), paratype, male (**C**) **A–C** habitus, lateral view (**A**), dorsal view (**B, C**). Scale bars: 1.0 mm.

Diagnosis. Structurally and in sharing long setae on the upper half of frons the new species is closest to *Epeolus alpinus*, *E. laevifrons*, *E. gorodkovi* sp. nov. and *E. mongolicus.* The new species differs from *Epeolus alpinus*, *E. laevifrons* and *E. gorodkovi* in having yellow-reddish (amber) pattern on metasomal terga (vs entirely black) and from *E. mongolicus* in having sparser pubescence on tergal discs (vs dense, as well as tomentum on marginal zones in *E. mongolicus*). Differences between the new species and other species of the *cruciger* group are outlined in Table 1 and the key.

Table 1. Differences between females and males of *Epeolus cruciger*, *E. mongolicus*, *E. asiaticus*, *E. alpinus*, and *E. gorodkovi*.

	cruciger	***mongolicus***	***asiaticus***	***alpinus***	***gorodkovi***
Female					
Upper half of frons	with short setae and mostly confluent punctures	with relatively long erect simple setae (can be mixed with appressed plumose pubescence usually extending ocelli); with polished interspaces between punctures	with relatively long erect setae; with polished interspaces between punctures		with relatively long erect setae and mostly confluent punctures
Labrum on apical margin	curved medially	slightly curved medially or more distinctly curved in large specimens		straight or slightly curved medially	
Punctation of mesoscutum	with punctures from mostly confluent to separated by a half puncture diameter, without distinct interspaces		with punctures from confluent to separated by at least a puncture diameter, usually with distinct polished interspaces		with punctures from mostly confluent to separated by a half puncture diameter, without distinct interspaces
Pubescence of mesoscutum	without tomentum or with a pair short paramedial strips	entirely covered with tomentum (but tomentum can be strongly shabby)	usually well developed on an anterior half, but without distinct paramedial strips	slightly developed, usually without paramedial strips	developed only on anterior margin
T2 apical band or spots of tomentum	widely interrupted band forming a pair of lateral spots, sometimes reduced to two pair small lateral spots	uninterrupted band, visually merged with dense discal pubescence	uninterrupted or narrowly interrupted medially	widely interrupted medially band (narrowly interrupted in Sakhalin specimens)	uninterrupted band
T3-T4 apical band or spots of tomentum	two pair (or extremely rare only a pair) whitish spots	uninterrupted bands, visually merged with dense discal pubescence	variable, usually uninterrupted or narrowly interrupted medially bands, or rarely with additional lateral interruption forming 2 or 4 spots	with a pair of large spots (sometimes with an additional pair of small lateral spots); in Sakhalin specimens with narrowly interrupted medially band or T4 uninterrupted band	uninterrupted bands
Coloration of labrum, pronotal lobes, axilla and mesoscutellum	variable from black to red or yellowish (amber)	always yellow-reddish (amber)	always yellow-reddish (amber)	variable from black to red or yellowish (amber)	black
Coloration of terga	extremely variable from black to reddish	yellow-reddish (amber); marginal zones yellowish	variable, from mostly black with small yellow-reddish (amber) pattern to mostly yellow-reddish; marginal zones light	black; marginal zones always dark (black or brownish)	black; marginal zones yellowish
Coloration of tergal band/spot of tomentum	white or yellow	copper or gold	yellowish (from pale to golden)	whitish or yellowish	whitish and yellowish
Pubescence on tergal discs	sparser than tomentum on marginal zones, from black or dark brownish to light brownish and rarely yellowish	dense (as well as tomentum on marginal zones), copper or golden	sparser than tomentum on marginal zones; yellowish, golden, brown (the same coloration or darker than tomentum on marginal zones)	sparser than tomentum on marginal zones; dark brown	sparser than tomentum on marginal zones, dark brown

	cruciger	*mongolicus*	*asiaticus*	*alpinus*	*gorodkovi*
Male					
Upper half of frons	with short setae and confluent punctures	unknown	with relatively long erect simple setae (can be mixed with appressed plumose pubescence extending ocelli); with polished interspaces between punctures	with relatively long erect simple setae (maybe shabby!); with polished interspaces between punctures	relatively with long setae and confluent punctures
Apical band or spots of tomentum	whitish; on T1 and T2 widely interrupted bands; on T3 and T4 two pairs of spots		uninterrupted yellowish band	T1-T3 with interrupted medially whitish band, on T4 narrowly interrupted or uninterrupted band, or on T3 and T4 often reduced to 4 spots	uninterrupted whitish band
Coloration of terga	black		variable, with different proportion black and yellow-red, marginal zones transparent and pale-yellow or yellow.	black, marginal zones black or brownish	black, marginal zones pale-yellow to golden
Gonostylus apical area [membranous area with long setae and curved towards central axis]	narrow as seen as ventral view			relatively wide as seen as ventral view	
Gonostylus in lateral view	almost parallel-sided			apically triangular, distinctly curved	

Description. Female (holotype). Total body length 8.0 mm (Fig. 1A, B); forewing length (without tegula) 6.0 mm.

Structure and sculpture: Head (Fig. 2A) transverse, 1.26 times as wide as long. Labrum (Fig. 2E) 1.6 times as wide as long, rounded basally and laterally, apical margin slightly curved with small distinct medial tooth; sub-apically with two well-visible teeth; integument shiny, coarsely and densely punctate (15–30 μm / confluent–0.5). Clypeus densely and finely punctate (10–15 μm / confluent–0.5), narrowly impunctate along apical margin. Frons with developed frontal keel. Upper half of frons and ocellocular area with shiny interspaces between punctures (15–30 μm / confluent–1.5). Flagellomeres ca 1.1 times as long as wide. Mesoscutum coarsely punctate (25–40 μm / confluent–1.5), interspaces between punctures shiny and smooth; mesoscutellum areolate-punctate. Axilla short and flat, pointed apically, but without distinct tooth. Mesoscutellum with shallow medial longitudinal impression; posterior margin scarcely extending over propodeum. Mesepisternum mostly areolate-punctate, with few interspaces ca one puncture diameter. Propodeal triangle shagreened; posterior vertical surface of propodeum shiny and smooth. Metasomal terga densely and finely punctate (10–15 μm / 0.5–1), interspaces shiny and smooth. Pseudopygidial area short, triangular. Pygidial plate trapezoidal, apically truncate. Processes on sides of S6 normal, with short projections. Sterna densely punctured like terga (Fig. 2D). S5 wide, straight as seen in lateral view.

Integument coloration: Head mostly black, but mandibles (excluding dark apex), labrum, clypeus along apical margin, and F1 (partly) yellow-red (amber). Mesosoma mostly black; pronotal lobe, tegulae, axillae, mesoscutellum, metanotum medially and legs (including spurs) yellow-red (amber); wings with brownish darkening, stigma and veins brown. Metasomal terga mostly black, but yellow-red on posterior half of T1, along marginal zones of T2–T4 (narrow strip), and posterior half of T5; marginal zones amber, transparent. Pygidial plate yellow-red with brownish edging. Sterna brownish, yellow-red laterally and along marginal zones; marginal zones pale yellow.

Pubescence: Pale tomentum yellow to white. Labrum with sparse thin golden setae. Paraocular and supraclypeal areas with dense tomentum obscuring integument, clypeus with sparse pubescence. Upper half of frons with long simple setae (Fig. 2C). Vertex with sparse thick (plumose) setae. Genal integument almost obscured by tomentum. Pronotum dorsally with tomentum obscuring integument. Mesoscutum with thick plumose setae, dense on anterior third and peripherally; with a few erect simple setae. Metanotal integument almost entirely obscured by tomentum. Mesepisternum with tomentum denser on upper half and laterally. Ventral parts of mesosoma with dense white tomentum. Legs with white setae. T1 with wide basal band of pale tomentum connected with apical band laterally; marginal zones on T1–T4 with uninterrupted bands of pale tomentum, but medially tomentum sparser and not obscuring integument. Setae on tergal discs brownish; sparser and shorter than on apical bands. Pseudopygidial area with silvery pubescence. Sterna with golden short and sparser setae; marginal zones of T2–T4 with white tomentum.

Male. Structure, sculpture, coloration and pubescence are similar to those of the female (Fig. 1C). Head (Fig. 2B) transverse, ca 1.2 times as wide as long. F1 1.2–1.4

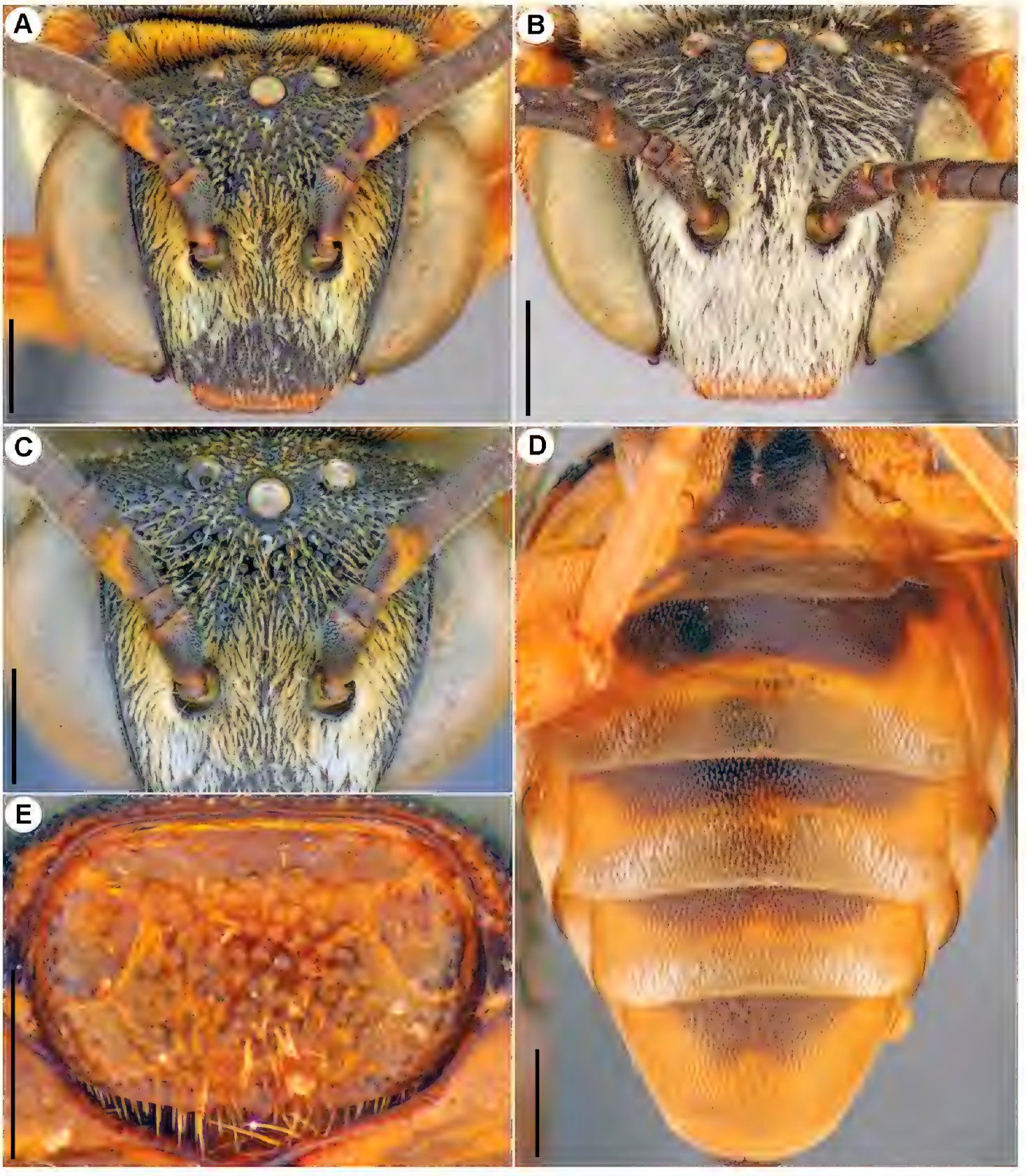

Figure 2. *Epeolus asiaticus* Astafurova & Proshchalykin, sp. nov., holotype, female (**A, C–E**), paratype, male (**B**) **A, B** head, frontal view; dorsal view **C** frons and vertex, frontal view **D** metasoma, ventral view **E** labrum, frontal view. Scale bars: 0.5 mm (**A–D**); 0.3 mm (**E**).

times as wide as long, remaining flagellomeres about as long as wide or little longer. Pygidial plate (T7) shiny, coarsely and densely punctate, 1.1–1.2 times as long as basal width narrowed toward apex, with shallow punctures; apical margin slightly curved. Clypeus with dense tomentum obscuring integument. Marginal zones of S2 and S3 with dense uninterrupted white tomentum bands; S4 and S5 normal, with golden long setae. Gonostylus as on Fig. 9B, F.

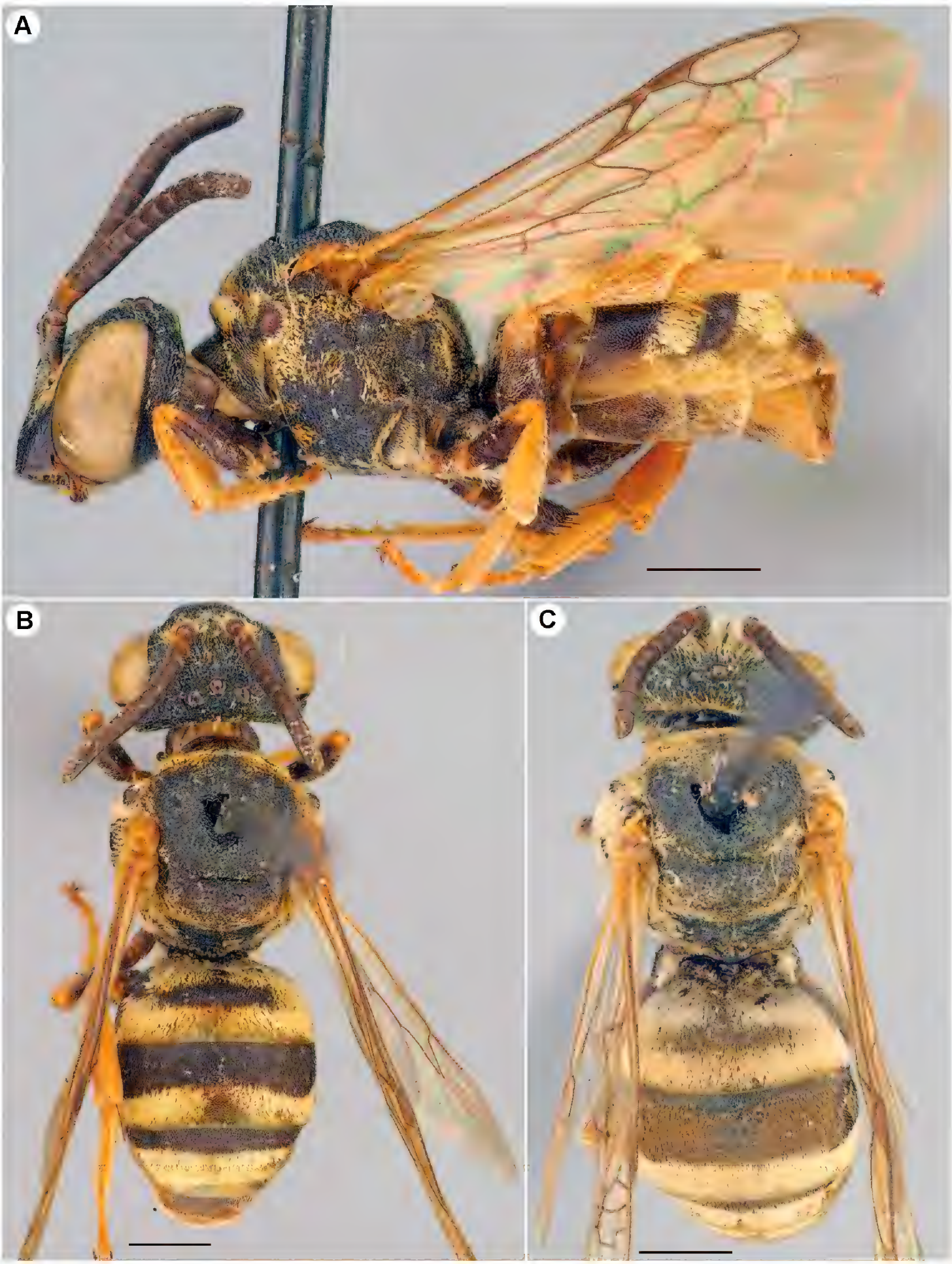

Figure 3. *Epeolus gorodkovi* Astafurova, sp. nov., paratype, female (**A, B**), holotype, male (**C**), **A–C** habitus, lateral view (**A**); dorsal view (**B, C**). Scale bars: 1.0 mm.

Variability. Female. Total body length is 4.5–9.0 mm. The mesoscutellum is usually flattened with a weak medial longitudinal impression, but in large specimens this impression can sometimes be deep. The labrum, mandible, pronotal lobe, tegulae, legs,

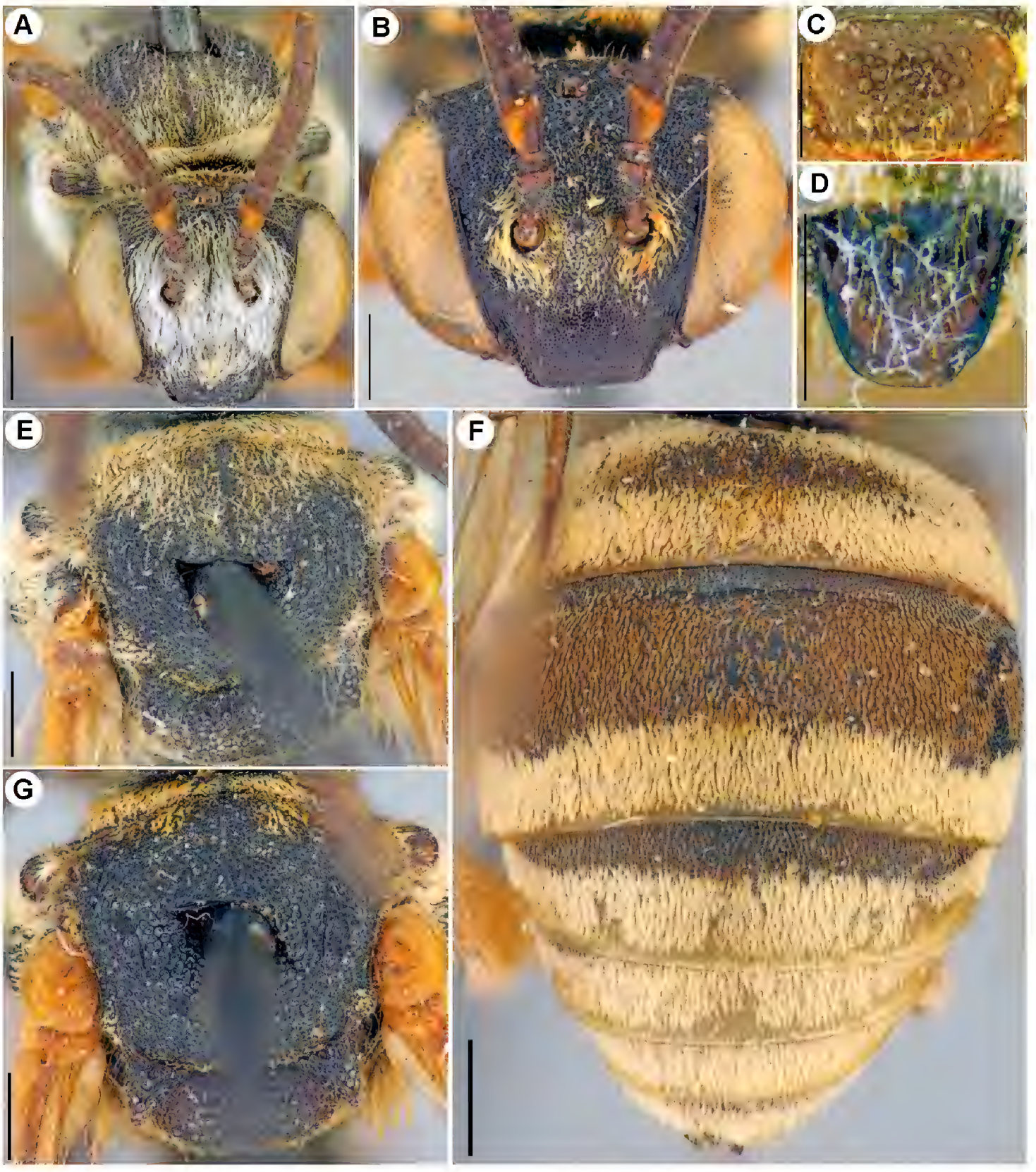

Figure 4. *Epeolus gorodkovi* Astafurova, sp. nov., holotype, male (**A, C–F**), paratype, female (**B, G**) **A, B** head, frontal view **C** labrum, frontal view **D** T7, dorsal view **E, G** mesosoma, dorsal view **F** metasoma, dorsal view. Scale bars: 0.5 mm (**A, B, E–G**); 0.3 mm (**C, D**).

axillae and mesoscutellum are always yellow-reddish (amber); the clypeus is usually yellow-reddish apically as well as scape and partly F1. The females of this new species exhibit considerable intraspecific variation in the metasomal coloration and degree of development of the tergal tomentum bands. This variability is expressed in a huge variety of combinations of these features (Fig. 7A–G). Among all the specimens examined, there is not one where such a combination was more or less the same. The coloration of terga on discs ranges from mostly black (but never wholly) to a well-developed yellowish pattern; the proportion of yellow differs, but yellowish coloration is common on pos-

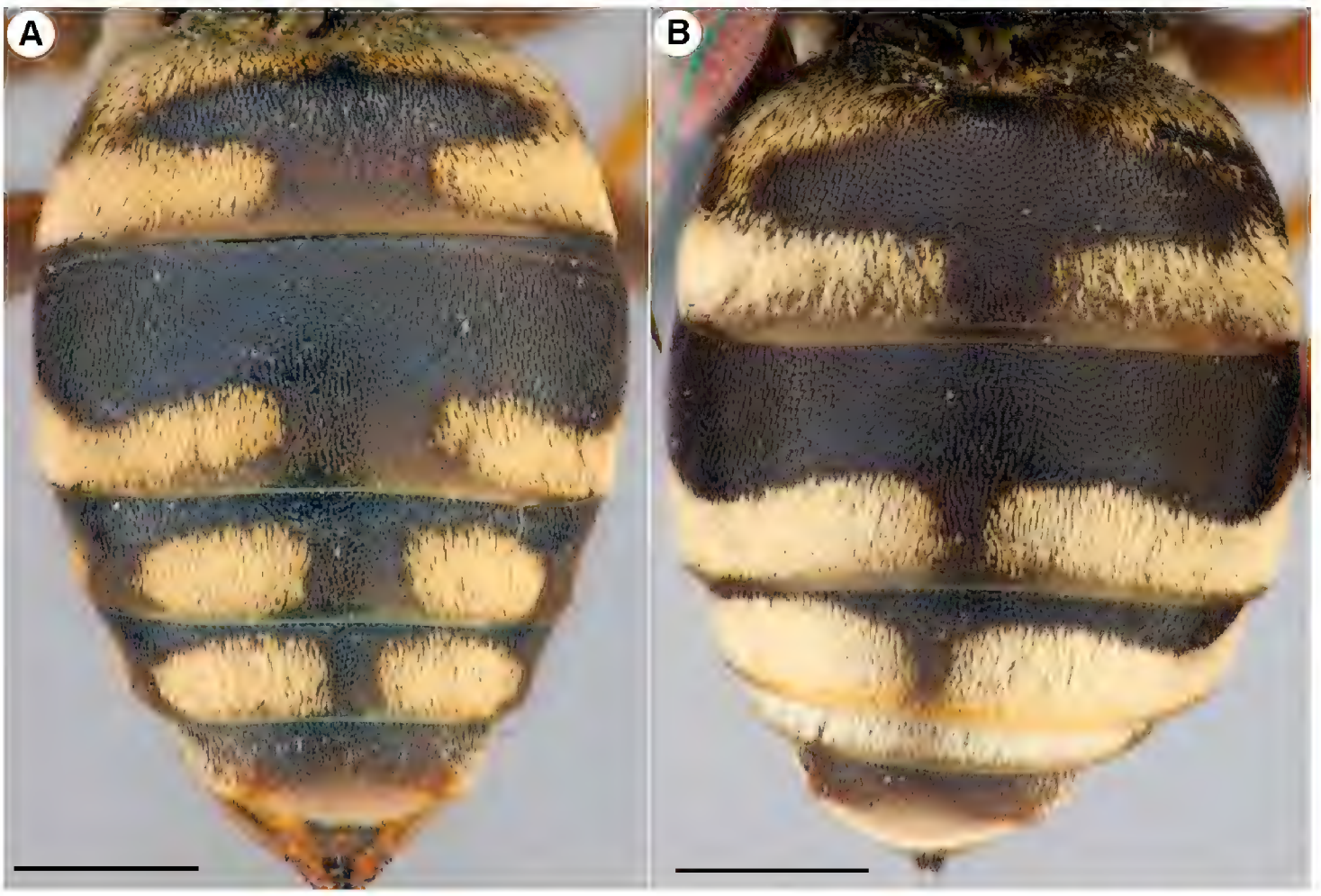

Figure 5. *Epeolus alpinus* Friese, 1893, females, typical form (**A**), "Sakhalin" form (**B**) **A, B** metasoma, dorsal view. Scale bars: 1.0 mm.

terior half T1 and T5 and as a narrow strip along marginal zones of T2–T4. The sterna are yellow-reddish on marginal zones and can be reddish, brownish or black on discs.

Apical bands on T1–T4 typically uninterrupted (Fig. 7E), but tomentum medially can be sparser and darker (Fig. 7C, D, F, G); or bands are distinctly interrupted (Fig. 7B). The tomentum coloration is yellowish, but varies from pale yellow to bright golden. The coloration of pubescence on tergal discs ranges from yellowish to brownish (i. e. can be contrasting or not with coloration of tomentum bands).

In nine (5%) female specimens, the second submarginal crossvein is incomplete or lacking completely (Fig. 8A). A single teratological specimen has an additional submarginal cell (Fig. 8B).

Male. Total body length 5.0–7.0 mm. The apical margin of the pygidial plate is sometimes straight or rarely slightly bilobed. The coloration of pedicel, scape and F1 varies from partly yellow-red to brownish. Variation in metasomal integument coloration is similar to that of the female with different proportions of black and yellow-red (Fig. 7H, I). Apical tomentum bands are typically uninterrupted (Fig. 7I), but sometimes tomentum setae medially are sparser and darker (Fig. 7H). Tergal discs setae are white, yellowish, golden or rarely brownish. The sterna can be brownish or black on discs, but typically it is with yellow-reddish pattern laterally and along marginal zones; marginal zones pale-yellow or yellow.

Etymology. The specific name "*asiaticus*" is an adjective in the nominative singular that means "Asian" in Latin and refers to the occurrence of this species in Asia.

Distribution. Russia (Tyva Rep., Zabaikalskiy Terr.), Mongolia (Arkhangai, Bayankhongor, Bayan-Ölgii, Dornod, Dornogovi, Govi-Altai, Khuvsgul, Omnogovi, Selenge, Sukhbaatar, Tuv, Ulaanbaatar, Uvs, Uvurkhangai, Zavkhan).

***Epeolus cruciger* (Panzer, 1799)**
Fig. 6

Nomada crucigera Panzer, 1799: 20, ♂ (type locality: Austria), Natural History Museum, Berlin.
Epeolus rufipes Thomson, 1870: 91, ♀ (type locality: S-Sweden), Zoological Museum of University Lund, Sweden.
Epeolus similis Höppner, 1899: 355–356, ♀, ♂ (type locality: Freisenbüttel, Germany), Natural History Museum, Berlin.
Epeolus cruciger var. *elegans* Müller, 1921: 168, ♀ (type locality: Arnswalde, Germany), Natural History Museum, Berlin.
Epeolus cruciger var. *rufiventris* Müller, 1921: 168, ♀ (type locality: Arnswalde, Germany), Natural History Museum, Berlin.
Epeolus marginatus Bischoff, 1930: 11, ♀, ♂ (type locality: Warnemünde, Germany), Natural History Museum, Berlin.

Material examined. Russia, *Chelyabinsk Prov.*, Metlino, 23.VIII.2004, (3 ♀), P. Rudoiskatel [ZISP]; Voznesenskaya, 16.VII.2017, (1 ♂), K. Fadeev [ZISP]; *Orenburg Prov.*, Spassk[oye], (1 ♀, 1 ♂), coll. Eversmann [ZISP]; Orenburg, 18.VII.1920, (10 ♀, 1 ♂), P. Vorontzovskiy [ZISP]; *Permskiy Terr.*, Kisherti, 29.VII.1961, (2 ♀ , 1 ♂), Shemina [ZISP]; *Sverdlovsk Prov.*, Sysertskiy distr, Dvurechensk, 29.VII.2007, (2 ♀), P. Rudoiskatel [ZISP]; *Kemerovo Prov.*, Chebulinsk distr., Dmitriyevka, 8.VIII.2005, (1 ♀), N. Yeremyeva [ZISP]; Mozzhukha, 6.VII.2006, (1 ♂), Korshunov [ZISP]; 10 km NE Novokuznetzk, on *Allium rubens*, 31.VII.2008, (3 ♀), DS [ZISP]; 5 km NE Prokopyevsk, on *Veronica spicata*, 15.VIII.2009, (3 ♀), DS [ZISP]; *Altaisky Terr.*, 15 km S Blagoveshchenki, Kuchukskoye Lake, 20–21.VII.2017, (4 ♀, 3 ♂), MP [FSCV/ZISP]; 18 km NNW Rodino, Kuchuk River, 22.VII.2017, (1 ♀, 1 ♂), MP [FSCV/ZISP]; Kulundinskoye Lake, Znamenka, 24.VII.2017, (2 ♀), MP [FSCV/ZISP]; 30 km S Kuray, Savvushka, 31.VII.2007, (1 ♀), SB [ZISP]; 5 km SSE Solonovka, 1.VIII.2021, (1 ♀), DS [FSCV/ZISP]; *Khakassia Rep.*, Oshkol' Lake, 7.VIII.2007, (1 ♀), M. Shcherbakov [FSCV/ZISP]; Sosnovoe Lake, 2.VIII.2018, (5♀, 5 ♂), SL, DS [ZISP]; *Tyva Rep.*, 20 km NW Chadan, 9.VII.2009, (1 ♂), SB [ZISP]; 90 km S Kyzyl, Chagytay Lake, 21.VII.2010, (2 ♂), SB [ZISP]; 15 km NE Tyran, 31.VII.2009, (2 ♂), SB [ZISP]; Kyzyl, 15–19.VII.2010, (5 ♂), SB [ZISP]; Uvs-Nur Lake, 24.VII.2010, (1 ♀, 4 ♂), SB [ZISP]; Balgazyn, 29.VII.2010, (2 ♂), SB [ZISP]; 7 km SE Erzin, Tes-Khem River, 13.VII.2014, (4 ♀, 5 ♂), AL, MP, VL [FSCV/ZISP]; 12 km SW Samagaltay, Dyttyg-Khem River, 17.VII.2014, (4 ♂), AS, MP, VL [FSCV/ZISP]; 6 km SE Bay-Khaak, 20–21.VII.2014, (1 ♀), AL, MP, VL [FSCV/ZISP]; 32 SW Kyzyl, Elegest River, 22.VII.2014, (1 ♀, 2 ♂), AS, MP, VL [FSCV/ZISP]; 12 km SSE Erzin, 23.VII.2018, (1 ♀), SL, DS [ZISP]; 11 km W of Ust-Elegest, 27.VII.2018, (1

♀), SL, DS [ZISP]; *Krasnoyarsk Terr.*, Krasnoyarsk, (1 ♀), coll. Morawitz [ZISP]; idem, 20.VII.2012, (1 ♀), MP, VL [ZISP]; Minussinsk distr., Novosyolovo, 8.VIII.1924, (1 ♀), Vinogradov [ZISP]; Minussinsk env., Malaya Minusa River, 4.VII.2012, (1 ♂), MP, VL [FSCV]; Kuragino, on *Veronica incana*, 18.VII.2018, (1 ♀, 1 ♂), SL, DS [ZISP]; *Buryatia Rep.*, Kurumkanskiy distr., Mayskiy, 23.VII.1995, (1 ♀), S. Rudykh [ZISP]; 18 km NE Malaya Kurba, 16.VIII.2016, (1 ♀), S. Rudykh [ZISP]; Ashan, 24.VII.2019, (1 ♀), Yu. Astafurova [ZISP]; *Irkutsk Prov.*, Irkutsk, (4 ♂), coll. F. Morawitz [ZISP]; idem, (1 ♂), V. Yakovlev [ZISP]; *Magadan Prov.*, Debin, 16.VII.1963, (2 ♀), Zhelkhovzev [ZMMU]; Kazakhstan, Semipalatinsk, (1 ♂), coll. F. Morawitz [ZISP]; Berchogur[=Birshoghyr], 17.VI.1910, (1 ♀, 5 ♂), L. Babyr [ZISP]; Dzhulek, Syr-Darja, 16.VI.1912, (2 ♂), L. Wolmann [ZISP]; Borovoye [=Burabay], 22.VII.1932, (4 ♀), V. Popov [ZISP]; Akmola Prov., Shortandy, 1.VII.1939, (1 ♀), B. Kuzin [ZMMU]; Yanvartzevo, 16.VI.–16.VIII.1950, (12 ♀, 32 ♂), Rudolf [ZISP]; Kharkin, Ural River, on *Senecio jacobacea*, *Allium angulosum*, 21.VI–3.VIII.1951, (29 ♀, 58 ♂), Rudolf, Popov [ZISP]; Derkul, 2.VIII.1953, (1 ♂), M. Belkovskiy [ZISP]; Alma-Ata, Aksay, 16.VII.1981, (1 ♀, 1 ♂), Kocourek [OLBL]; 20 km SE Askay, 16.VI.1992, (1 ♀), JH [OLLM]; Taldy-Kurgan, 200 km NE Cherkaskoye, 27.VI.1992, (1 ♀, 1 ♂), M. Halada [OLBL]; Balkhash, 28.VII.1992, (2 ♂), JH [OLBL]; 12 km N Balkhash, Kounradskiy, 1.VIII.2014, (1 ♂), K. Fadeev [ZISP]; Kyrgyzstan, Ak-Ulen, Issyk-Kul Lake, 29.VI.1953, (1 ♀, 1 ♂), D. Panfilov [ZMMU]; Pokrovka, Issyk-Kul Lake, 16.VII.1954, (1 ♀), D. Panfilov [ZMMU]; Tash-Arik, 11 km E Talas, 4.VII.1992, (1 ♂), Jirausek [OLBL]; Uzbekistan, Ambasar, 17.VIII.1936, (1 ♂), P. Rezvoy [ZISP]; Margilan, (1 ♀, 1 ♂), coll. F. Morawitz [ZISP]; Dzhuma, on *Tamarix* sp., 25.VI.1937, (1 ♂), V. Popov [ZISP]; Kurgan-Tube, 23.V.1938, (1 ♀), V. Popov [ZISP]; Turkmenistan, Chuli, Kopet Dag Mts, 16.VI.1914, (1 ♀), A. Golbek [V. Popov det. as *E. cruciger*] [ZISP]; Iran, Tabriz, 12.VI.1914, (1 ♀), Andrievskiy [ZISP].

Remarks. We also have examined 80 specimens of this species (36 ♀, 44 ♂) from the European part of Russia and from the Caucasus. We have not listed materials from Yakutia published by Davydova and Pesenko (2002). A few specimens were misidentified by these authors and belong to *E. alpinus* (*vide supra*). A record from Sakhalin (Proshchalykin et al. 2004) also corresponds to *E. alpinus*.

Distribution. Europe, Turkey, Syria, Iran, Russia, Kazakhstan, *Turkmenistan, *Uzbekistan, *Kyrgyzstan, Mongolia (Dornod, Khentii, Khovd, Khuvsgul) (Bogusch and Hadrava 2018; Astafurova and Proshchalykin 2021b).

Variability. Female. *Integument coloration*. There are two main forms: dark with black/brownish metasoma (Fig. 6A, B) and light with reddish metasoma (Fig. 6C, D). Extremely dark specimens have yellow only on the mouth parts, tegulae and legs; this form is rare. A reddish labrum and mesoscutellum were found in most of the dark specimens examined. Extremely light individuals have a reddish or amber labrum, antennae, clypeus, lateral and lower part of mesosoma, mesoscutellum, axillae, metanotum, and mesosoma. In this case, the mesoscutum is partly reddish (laterally and with reddish spots posteriorly). Darker forms predominate in the forest zone and are rarer in the steppe zone. However, both forms can occur in the same location. *Pubescence coloration*. Pubescence of the head and mesosoma and tergal bands or spots of tomentum are white or pale yellow. Bright individuals (with yellow pubescence) are extremely

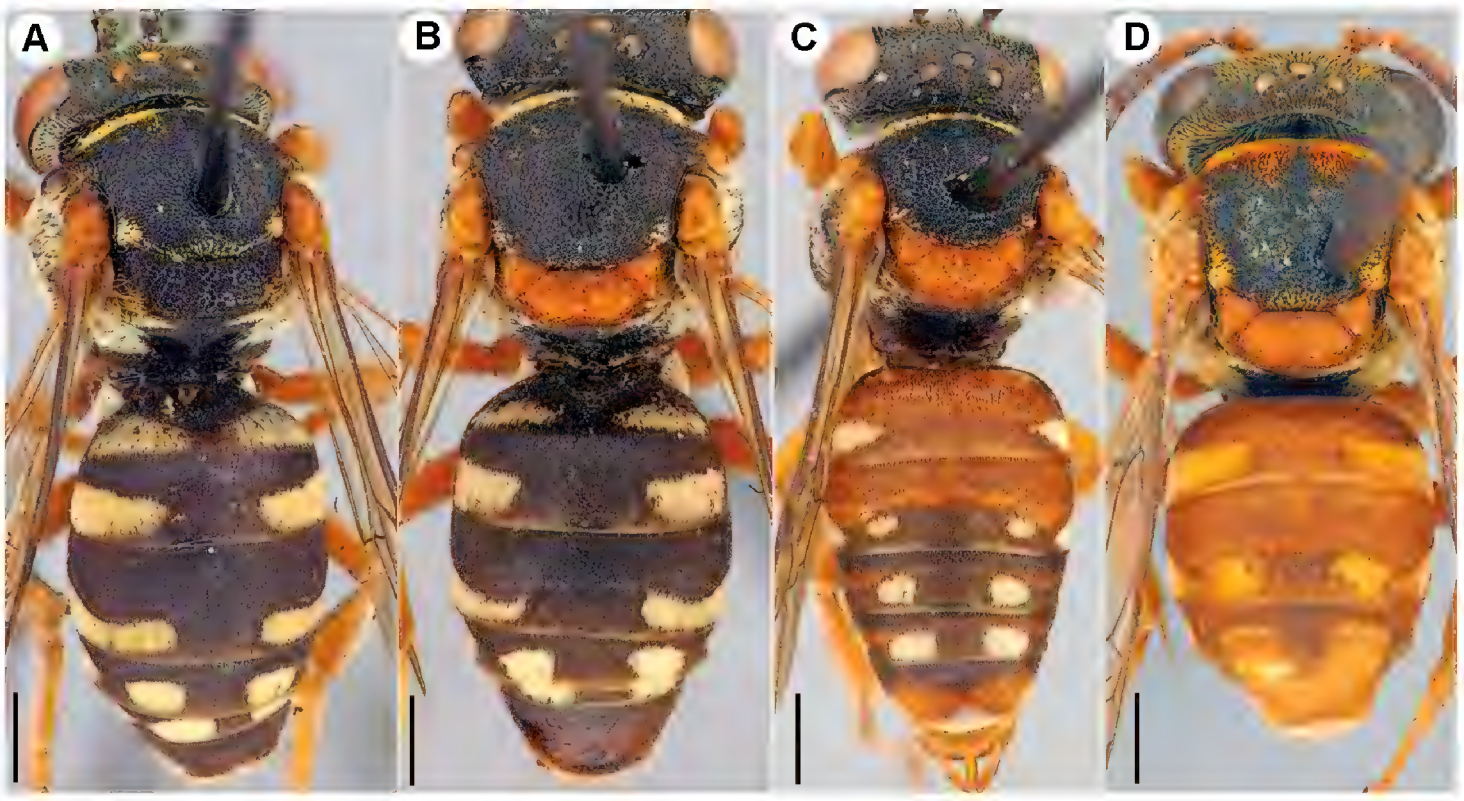

Figure 6. *Epeolus cruciger* (Panzer, 1799), females, black forms (**A, B**), red forms (**C, D**) **A–D** habitus, dorsal view. Scale bars: 1.0 mm.

rare and occur in the southern part of the range of this species. Coloration of tergal disc pubescence is quite variable and correlates with integument coloration: black or dark brownish in dark forms and light brownish (rarely yellowish) in light forms. *Development of tomentum*. The mesoscutum lacks tomentum or has only a pair of short paramedial strips. The development of white tomentum apical band or spots on terga is variable, but this tomentum is always interrupted medially. T1 and T2 have widely interrupted apical tomentum bands forming a pair of lateral spots, on T2 sometimes reduced to two pairs of small lateral spots (Fig. 6C). T3 and T4 are with two pairs of lateral spots or rarely with a single pair. **Male.** Males do not show significant variability. Yellow-red coloration is usually absent, except mouth parts, legs, tegulae and pygidial plate; labrum, pronotal lobe, mesoscutellum, axillae are only rarely reddish. Tomentum is white or pale-yellow.

***Epeolus gorodkovi* Astafurova, sp. nov.**

https://zoobank.org/28FE7A01-AF79-4ABA-BB66-E2A29D9A308B

Figs 3, 4, 9A, E

Material examined. ***Holotype*:** ♂, Tajikistan, Pamir Mts, Murgab River Valley, Zapadny Pshart River, 3325 m, on Myricana squamosa, 29.VI.1958, K. Gorogkov [ZISP]. ***Paratypes*:** 1 ♀, 16 ♂, the same label as in the holotype [ZISP]; 1 ♂, Afghanistan, Ghazni, Moqur, 2000 m, 24.VI.1970, Kabakov [ZISP].

Diagnosis. Structurally and in coloration, the new species is very similar to *Epeolus alpinus* but differs in having uninterrupted apical tergal bands, denser and lighter pubescence on tergal discs (light brown to yellowish) and yellowish marginal zones

on terga (black or brownish in *alpinus*). The upper half of frons, ocellocular area and mesoscutum are mostly confluently punctate (with a few shiny interspaces) and similar to those in *E. cruciger*. Differences between the new species and other species of the *cruciger* group are outlined in Table 1.

Description. Male (holotype). Total body length 6.5 mm (Fig. 3C); forewing length (without tegula) 5.0 mm.

Structure and sculpture: Head (Fig. 4A) transverse, ca 1.3 times as wide as long. Labrum (Fig. 4C) 1.6 times as wide as long, rounded basally and laterally, apical margin slightly curved medially with small distinct medial tooth; sub-apically with two well-visible teeth; integument shiny, coarsely punctate (15–25 μm / confluent–1). Clypeus densely and finely punctate (ca 10 μm / confluent). Frons with well-developed frontal keel. Upper half of frons mostly with confluent punctures (15–20 μm), sparser on ocellocular area. Antennae short, flagellomeres ca as long as wide. Mesoscutum and mesoscutellum (Fig. 4E) coarsely (25–40 μm) and mostly areolate-punctate with a few interspaces at most a half puncture diameter. Axillae short and flat, apically with small tooth (Fig. 4E). Mesoscutellum with medial longitudinal impression; posterior margin scarcely extending over propodeum. Mesepisternum areolate-punctate, with shiny interspaces on hypoepimeral area. Propodeal triangle shagreened; posterior vertical surface shiny and smooth. Metasomal terga densely and finely punctate (10–15 μm / 0.5–1), interspaces shiny and smooth. Pygidial plate (T7) coarsely and densely punctate, shiny between punctures, 1.0–1.1 times as long as basal width, narrowed toward apex, with shallow punctures; apical margin slightly curved (Fig. 4D). Sterna punctured like terga, but sparser.

Integument coloration. Head black, except partly red-yellowish mandibles, brownish antennae and apically yellowish F1. Mesosoma black, except red-yellowish tegulae, tibiae and tarsi. Metasomal terga black, but marginal zones pale-yellow to golden. Sterna brownish with marginal zones the same color as on terga.

Pubescence: Tomentum whitish to yellow (except sometimes brownish on tergal discs). Labrum apically with sparse thin setae. Paraocular and supraclypeal areas with dense tomentum obscuring integument, pubescence on clypeus sparser, shorter and shabby. Upper half of frons with long simple setae. Vertex with sparse thick (plumose) setae. Gena with dense tomentum, but not obscuring integument. Pronotum dorsally with tomentum obscuring integument. Mesoscutum with tomentum of adpressed plumose setae (dense on anterior third and peripherally) and long erect simple setae. Metanotal integumentalmost obscured by short tomentum. Mesepisternum and ventral parts of mesosoma with long tomentum obscuring integument. Legs with white setae. Terga (Fig. 4F) with uninterrupted apical (on marginal zone) light bands of tomentum; T1 entirely covered light tomentum, but with setae medially sparser and shorter; pubescence on other tergal discs short, relatively dense, the same color as on marginal zones or darker to brownish. Marginal zones of S2 and S3 with dense uninterrupted white bands of tomentum; S4 and S5 normal, with golden long setae. Gonostylus as in Fig. 9A, E.

Female. Structure, sculpture, coloration and pubescence are similar to those of the male (Fig. 3A, B). Head (Fig. 4B) 1.25 times as wide as long. Flagellomeres ca 1.1 as long as wide. Pseudopygidial area short, triangular. Pygidial plate trapezoidal, apically truncate. Processes on sides of S6 normal, with short projections. S5 wide, straight as seen

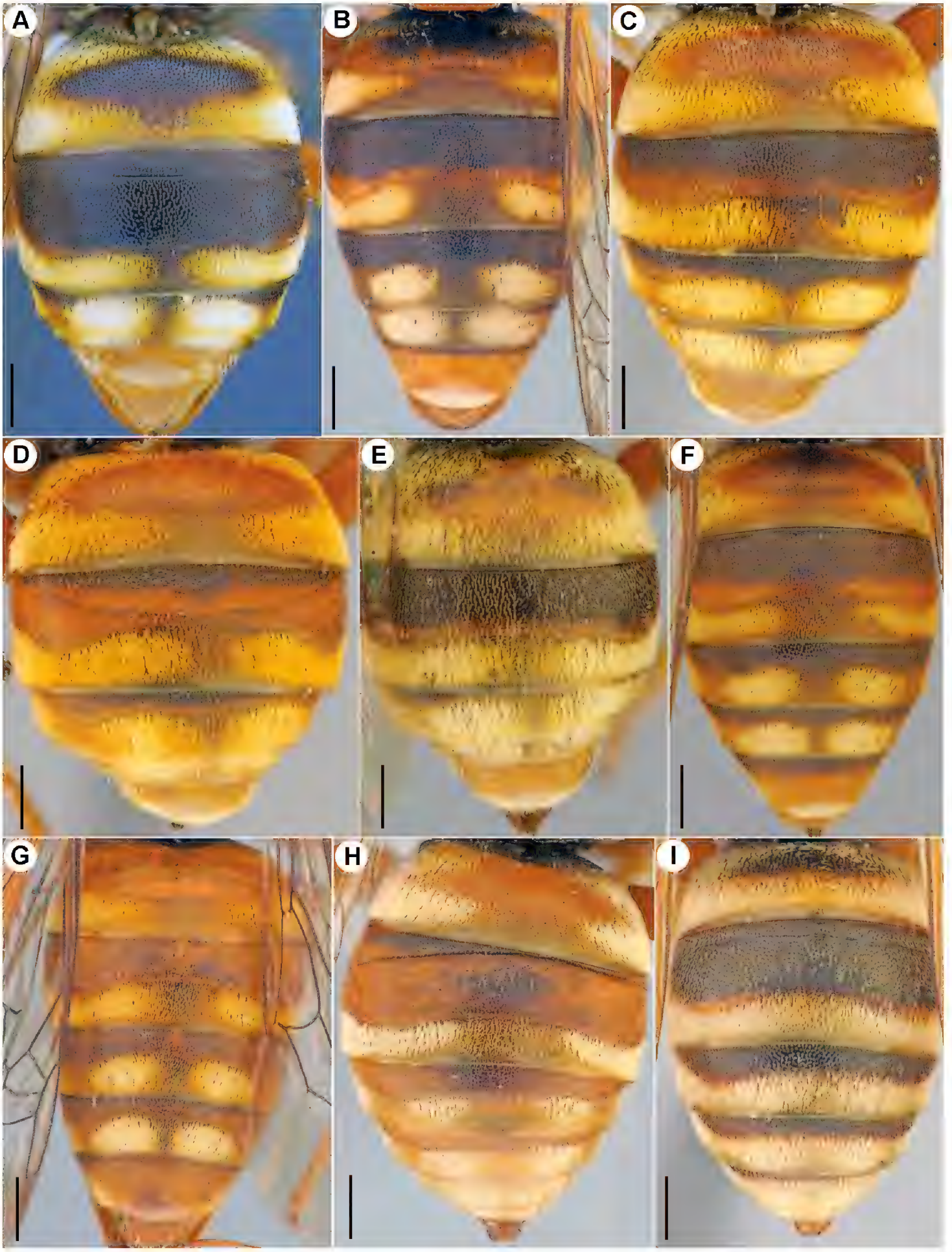

Figure 7. *Epeolus asiaticus* Astafurova & Proshchalykin, sp. nov., females (**A–G**), males (**H, I**) **A–I** metasoma, dorsal view. Scale bars: 0.5 mm.

in lateral view. Head with adpressed tomentum around antennal sockets (in the single female specimen). T1 with wide basal whitish band of tomentum medially separated by brownish sparser pubescence and connected with apical band laterally; brownish pubescence on tergal discs contrasting with light tomentum bands on marginal zones.

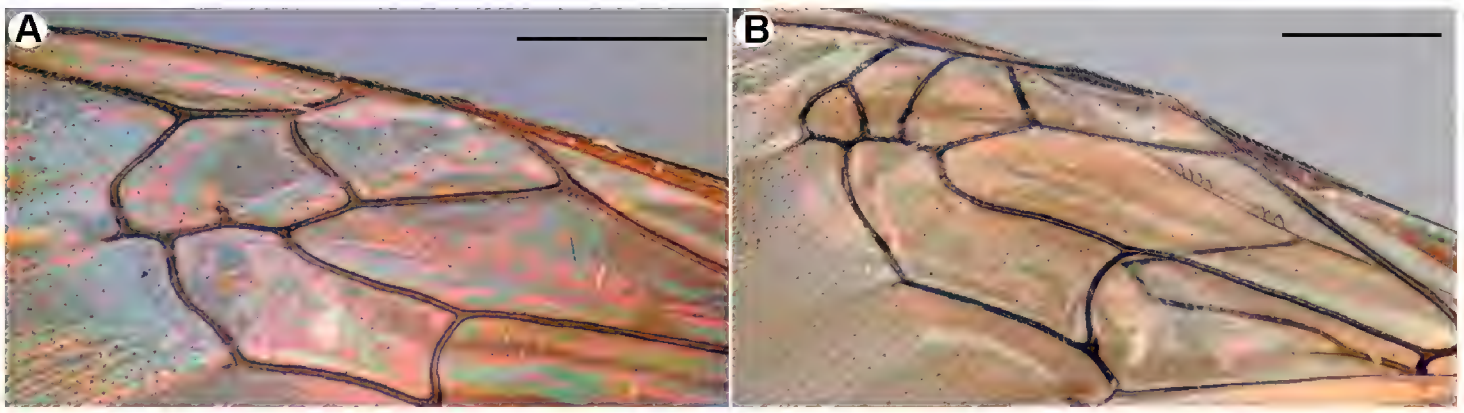

Figure 8. *Epeolus asiaticus* Astafurova & Proshchalykin, sp. nov., females (**A, B**) **A, B** part of the forewing, lateral view. Scale bars: 0.5 mm.

Variability. The male specimen from Afghanistan has a red labrum, F1, pronotal lobes and pygidial plate.

Etymology. The new species is named in honor of famous Russian entomologist and zoogeographer Kirill B. Gorodkov (1932–2001), the collector of the type series.

Distribution. Tajikistan, Afghanistan.

Epeolus mongolicus Astafurova & Proshchalykin, 2021

Epeolus mongolicus Astafurova & Proshchalykin, 2021b: 19, ♀ (holotype: ♀, W Mongolia, Zavkhan, 40 km SW of Uliastay [OLBL]).

Material examined. Kyrgyzstan, Ak-Ulen, Issyk-Kul Lake, 29.VI.1953, (1 ♀), D. Panfilov [ZMMU]; Ala-Tal, Nura, Kysyl Suu, 2900 m, 22.VII.1999, (1 ♀), F. Wagner [OLBL]; Russia, Tyva Republic, 25 km SE Erzin, Tes-Khem River, 14–15. VII.2014, (1 ♀), AL, MP, VL [ZISP], Mongolia, see Astafurova and Proshchalykin (2021b: 19).

Distribution. *Kyrgyzstan, Mongolia (Bulgan, Zavkhan), *Russia (Tyva Republic) (Astafurova and Proshchalykin 2021b).

Remarks. Male unknown.

Epeolus schummeli Schilling, 1849

Epeolus schummeli Schilling, 1849: 104, ♀ (type locality: Schlesien), type lost.
Epeolus ruthenicus Radoszkowski, 1891: 245, ♂ (type locality: Minsk, Belarus), Natural History Museum, Berlin.

Material examined. Belarus, Grodno, (1 ♀), coll. F. Morawitz [*E. variegatus* Morawitz det.] [ZISP]; Russia, Simferopol, 3.VII.1921, (1 ♀), Gussakovskij [ZISP]; Ukraine, Kupiansk, 18.VI.1984, (2 ♀, 2 ♂), Yaroshevskiy [ZISP].

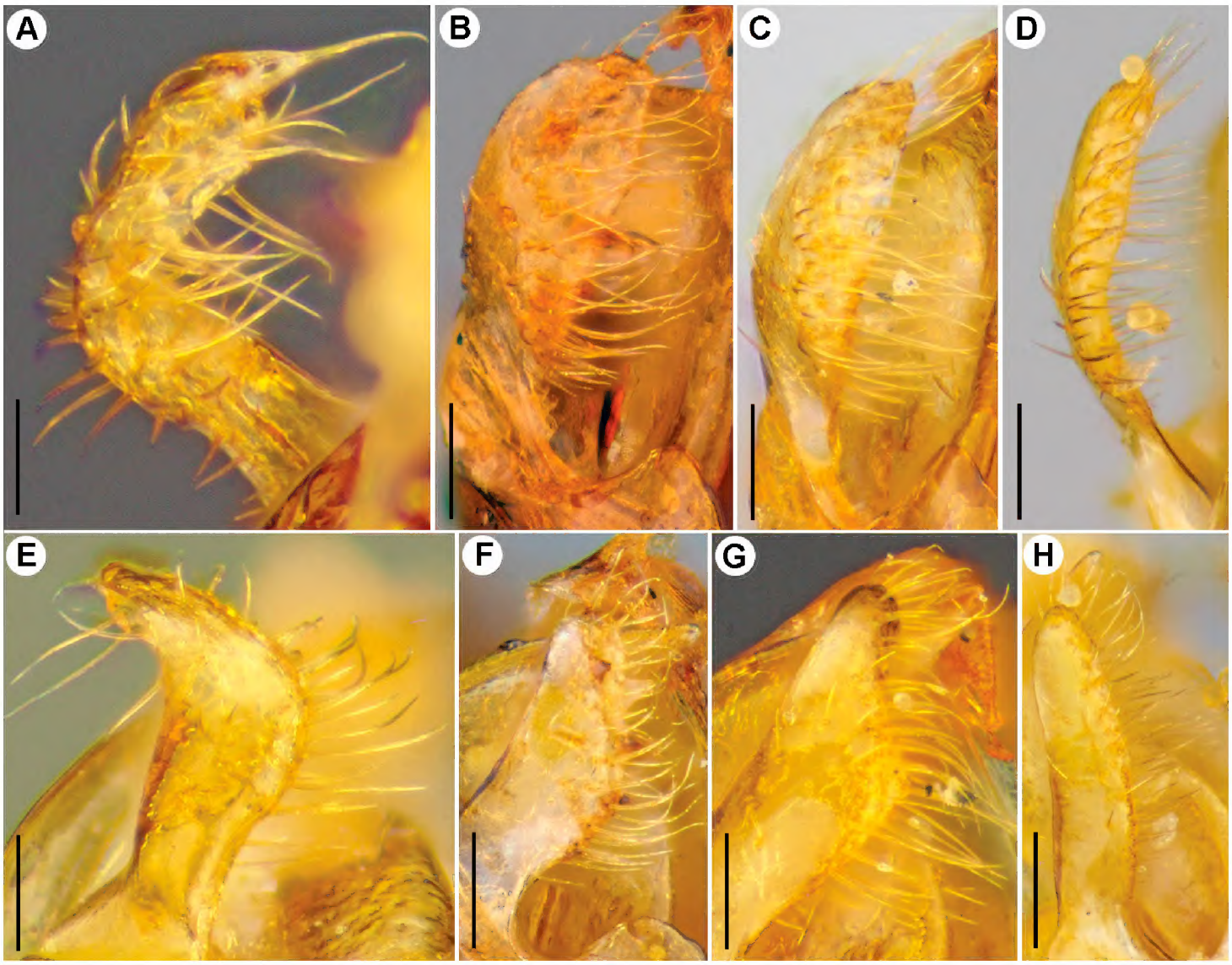

Figure 9. Male, gonostylus, ventral view (**A–D**), lateral view (**E–H**) **A, E** *Epeolus gorodkovi* Astafurova, sp. nov. **B, F** *E. asiaticus* Astafurova & Proshchalykin, sp. nov. **C, G** *E. alpinus* Friese, 1893 **D, H** *E. cruciger* (Panzer, 1799). Scale bars: 0.1 mm.

Distribution. Central and southern Europe, Caucasus, Turkey, Middle East, Ukraine, Belarus, Russia (south of the European part) (Bogusch 2018, 2021; Bogusch and Hadrava 2018; Le Divelec 2021).

Discussion

The *Epeolus cruciger* species group is distributed only in the Palaearctic region, and its range extends from northern Africa to the Russian Far East and China. *Epeolus cruciger* is most widespread and occurs from Europe over Central Asia to the Russian Far East. *Epeolus alpinus* is also widespread from Europe to the Far East, but it is mostly a boreal species and in the southern part of its range occurs in mountainous areas. *Epeolus schummeli* is a Western Palaearctic species, but is not known north of Poland. The rest of the species have narrow ranges or are endemic: *Epeolus laevifrons* (North Africa, Turkey), *E. sigillatus* (Greece: Crete), *E. mongolicus* and *E. asiaticus* (Mongolia and adjacent territory) and *E. gorodkovi* (mountains of Tajikistan and Afghanistan). No specimens of the group are recorded in Japan.

The females of several species demonstrate considerable intraspecific variation, but the males are less variable. Two species—*E. cruciger* and *E. asiaticus*—exhibit extreme variation in metasomal integumental coloration, having dark and light forms. In *E. cruciger*, the black forms predominate in the forest zone and are rarer in the steppe zone. However, both forms can be found in the same location. The same rule works for pubescence coloration, as brighter pubescence is generally exhibited by individuals from the southern area of its range. The large variation in body size is characteristic of most of species of this group (difference up to 1.5–2 times between the smallest and largest specimens). It should be noted that *E. alpinus* specimens from Asia are on average bigger than European ones. The Sakhalin population of *E. alpinus* represents a great example of differences between isolated island populations and typical continental forms, expressed in the development of the apical tomentum on terga. However, this case needs further investigation to determine whether subspecies or species status is warranted. Remarkable vitiation is seen in the reduction of the second submarginal crossvein (incomplete or lacking completely) found in 5% of female specimens of *E. asiaticus*. A similar phenomenon was also found in species from North America (Scarpulla 2018), including *E. americanus* (Cresson, 1878) and *E. asperatus* Cockerell, 1909 (Onuferko 2018).

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